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REMARKS

Claims 8-13, 21, and 22 are in the case.

The Specification has been amended in accordance with the Examiner's suggestion to recite the U.S. Patent No. for the parent case.

Claim 22 stands rejected under 35 U.S.C. 112, first paragraph as non-enabling.

The Examiner has taken the position that the specification does not include a written description of the invention as set forth in Claim 22 to reasonably convey to one skilled in the art in such full, clear, concise, and exact terms to enable any person skilled in the art to which it pertains at the time the application was filed, to make and use the claimed invention.

The Examiner points to the limitation in Claim 22 which reads: "protuberances or depressions sized such that a height of embossing elements which are not used to form visually distinctive icons is less than one-half a thickness of a paper sheet to be embossed." The Examiner takes the position that the specification is not enabling because the specific language as set forth is not found in the specification.

Applicant responds that the Claim 22 limitation is in the specification, in sufficient detail of information in the speci-

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fication description as a whole to teach this concept to one skilled in the art in the manner required by 35 U.S.C. 112, first paragraph. No new matter is added. Applicant provides the following Column and line references as support for the claim language.

At Col. 9, lines 25-30, the specification states that the ridges or channels, also known as protuberances or depressions, have a height or depth which is 0.08 millimeters or less, and preferably about 0.05 millimeters or less. These dimensions also are called out in Col. 5, lines 23-26, and Col. 5, lines 38-44.

At Col. 10, lines 18-20, the specification states that the 10 sheet caliper of the base sheet, the paper sheet to be embossed, used in the examples ranged from 1.829 to 1.956 millimeters.

One skilled in the art would understand from these passages that one sheet then has a caliper of $1.956/10$ or 0.196 millimeters, and would note that the height of a protuberance is less than one-half the thickness of a sheet. $0.10/0.196 = 0.51$, $0.08/0.196 = 0.41 < 0.5$, and $0.05/0.196 = 0.26 < 0.5$.

For the foregoing reasons the rejection of Claim 22 under 35 U.S.C. 112, first paragraph is believed to have been overcome and is respectfully requested to be withdrawn.

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Claims 8-9, 12-13, 21, and 22 stand rejected under 35 U.S.C. 103(a) as unpatentable over Schulz U.S. Patent No. 5,620,776 (hereinafter "Schulz").

The Examiner appears to misinterpret the scope and essence of the invention as pertains to the location of the broken bonds in the sheet because of controlled embossing. The Examiner's reference to Schulz in this respect takes the position that, when taking the sheet as a whole, a minority of bonds will be broken in the center 0.02 mm of the sheet thickness because bonds are only broken by embossing and only a minority of the XY plane of the sheet has been embossed.

However, Applicant's invention as claimed involves a minority of bonds broken in the outer 0.02 mm of the sheet thickness and not the center 0.02 mm as in the position taken by the Examiner.

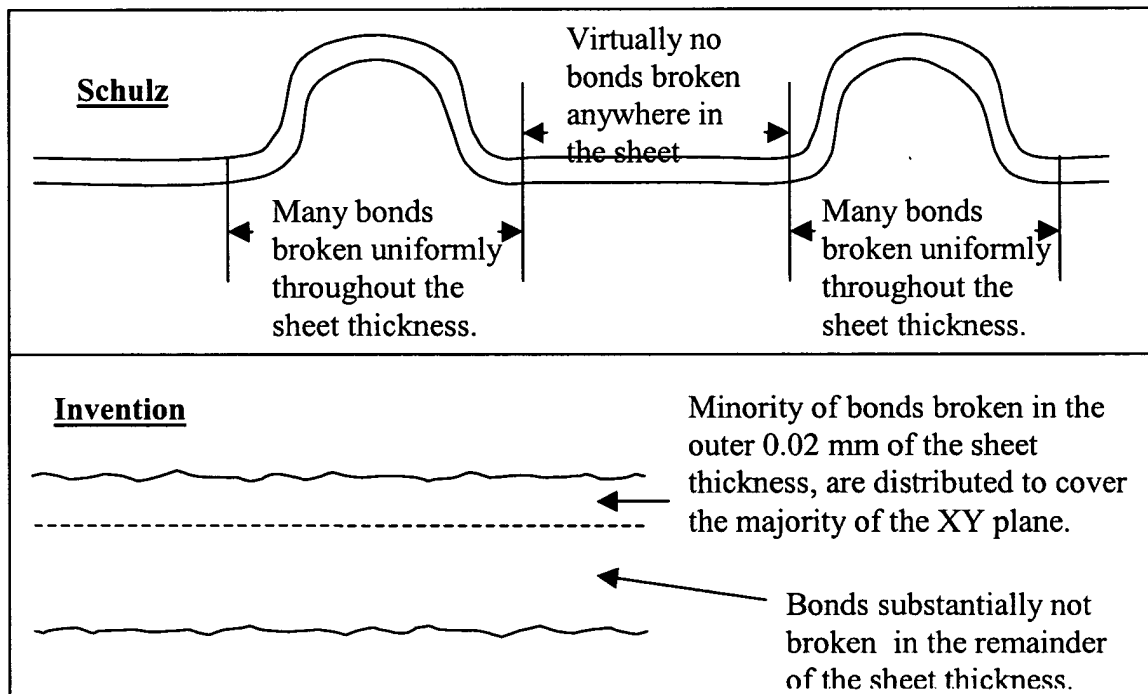
Moreover, the Examiner takes the position that the areas of the sheet which are not embossed will have virtually no bonds broken, and the Examiner admits that only a small percentage of the sheet is embossed in Schulz.

Schulz does not teach or suggest Applicant's invention since the embossing of the invention is distributed to cover the majority of the XY plane as shown by the Figures 3-8 wherein the

protuberances (50) and depressions (52) substantially cover the areas between the optional decorative protuberances (40).

Schulz does not teach or suggest that the broken bonds in the sheet are distributed non-uniformly in the Z direction (thickness) of the sheet as per the invention.

Applicant points to a depiction of a resulting product from the claimed invention shown in the drawings below.



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The Examiner's position to support the rejection of the claimed invention for embossments which are invisible to the unaided human eye is contrary to a motivation to fulfill the object of Schulz's invention. The Schulz depressions of 0.003" (0.076 mm) depth would not be seen by one skilled in the art to be invisible to the unaided human eye, because Schulz teaches or suggests the embossments must be clearly visible to the unaided human eye in order to fulfill the functions described the teaching of Schulz.

There are no passages in Schulz which specify that the embossments or debossments are invisible to the unaided human eye. As such, it is left to the person skilled in the art to determine this from the phrasing of the specification which does contain references to the visual appeal of the embossing pattern. Contrary to the Examiner's assertion that invisible embossments are taught in Schulz, the following passage from Schulz Col. 1, lines 14-15, states that "The present invention relates to an embossed web or sheet exhibiting high bulk and good emboss pattern definition." Also at Col. 3, lines 6-67, Schulz teaches that "The present invention is a paper product having improved bulk and superior pattern definition characteristics." The phrases "good emboss pattern definition" and "superior pattern

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definition" would be understood by one skilled in the art to mean that the embossing pattern is clearly and easily visible to the average person when viewing the finished sheet.

Moreover, at Col. 1. lines 49-51, Schulz states "When an emboss pattern is formed, the reverse side of the sheet retains a deboss pattern." It would be understood by one skilled in the art that in order to form a deboss on the reverse side of the sheet, the emboss must be of sufficient scale to project through the sheet. Thus it must:

- a. have an engraving depth greater than the thickness of the sheet to be embossed, and
- b. deform, and therefore break, bonds throughout the entire thickness of the sheet at each embossment.

Schulz, at Col. 1, lines 60-62, states "The present invention provides an embossed paper product which is significantly higher in bulk than prior art products." Since prior art products are known to have been embossed with large and easily visible protuberances, one skilled in the art would understand that in order for Schulz to provide significantly higher bulk, it is necessary that the embossments be at least of similar scale. Embossments small enough to be invisible to the unaided human eye would not provide sufficient bulk to meet this description.

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Schulz at Col. 4, lines 23-24, states "cells may be diamonds, hexagons,...or other readily recognizable shapes." Schulz at Col. 4, line 33, states "for example a large circle around a small heart." Since these phrases are describing visually distinctive shapes which are called out specifically as being readily recognizable, one skilled in the art would infer that the embossments of Schulz must be visible to the unaided human eye. This is also shown and taught by Figures 1, 3, 6-7, and 13-19.

Schulz at Col. 4, lines 54-57, teaches "Crenulated emboss elements have the advantages of...providing enhanced definition...to the embossed pattern." One skilled in the art would infer from the phrase "enhanced definition" that the emboss pattern is meant to be clearly and easily visible to the average person when viewing the finished sheet.

The Schulz Figures 13-14 are photographs of bath tissue according to the invention of Schulz. Each of these photographs shows all of the shapes described in the Schulz specification and drawn in Figures 1-7 and 12. One skilled in the art would understand that bath tissue commonly has a width of either 4.0" or 4.5" which can be applied to provide a scale to the Schulz Figure 13. The scale of the embossments shown provides further

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confirmation that they are intended to be easily visible to the average person when viewing the finished sheet.

Schulz at Col. 8, lines 66-67, and Col. 9, lines 1-2, states "six patterns were selected and visual testing was conducted. The six patterns which were selected are exemplified in FIGS. 1 and 15-19." This Schulz teaching provides a statement that the embossing patterns of Schulz were intended to be easily visible to the average person when viewing the finished sheet.

Schulz at Col. 10, line 26, teaches "Based upon initial consumer perception," and Schulz thereby implies that the embossing patterns of Schulz were easily visible to the average person.

The combination of the Schulz passages would be understood by one skilled in the art that in order to fulfill the advantages taught by Schulz, the embossments must be of sufficient size to be visible, and also must have an engraving depth greater than the thickness of the sheet to be embossed. Tissue paper of the type described by Schulz and utilized in the experiments for the present invention is commonly known to have a single sheet thickness from about 0.007" to 0.008" (0.178 to 0.203 millimeters) prior to embossing. Therefore, one skilled in the art would understand from the description of Schulz that the use of embossing elements with an engraved depth less than about 0.008"

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would not be suitable to replicate the teachings of Schulz despite the inclusion of reference to engraving depths as low as 0.003", which were not the subject of any examples, contained therein.

The Schulz U.S. Patent No. 5,620,776 as cited by the Examiner has incorporated by reference into it Schulz U.S. Patent No. 5,436,057 as per Col. 1, lines 7-11. Working further from the specification of U.S. Patent No. 5,436,057, one skilled in the art can find that Schulz states in Col. 1, lines 9-11, that "The embossed tissue of the invention results in superior overall appearance of the product..." and Col. 1, lines 56-63, that "The... debosses are positioned to give a 'puffy' quilted appearance creating both actual shading and the illusion of shading as would be seen in a quilt having chambers filled with fiber or down. This appearance results from the use of stitch-like rounded debossments arranged in wavy flowing intersecting lines both to simulate the appearance of stitches in a quilt...." One skilled in the art would understand from these phrases that the appearance of the emboss pattern is central to the invention of Schulz and thus is meant to be clearly and easily visible to the average person when viewing the finished sheet. The teaching at Col. 3, lines 49-50, "FIG. 1 is a life size photograph of several sheets

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of the present invention" and again in Col. 3, lines 63-66, "FIG. 6 is a life size photograph illustration the flat roll structure resulting from the use of the pattern of the present invention..." show the scale of the embossing pattern and that it would be easily visible to the average person when viewing the finished sheet. Every embossment described within the patent is visible in these photographs which further indicates that there are no invisible embossments contemplated by the invention of Schulz.

In regard to the Examiner's comments in the latest Office Action, it is Applicant's understanding that the Examiner has: Rejected Claims 8-9 and 12-13, citing U.S. 5,620,776 Schulz as teaching the use of:

- a) Very small embossing elements (0.003"-0.120"),
- b) On a small percentage of the tissue,
- c) Resulting in a minority of fiber to fiber bonds being broken.

With respect to Schulz, Applicant is familiar with the embossing pattern which is the subject of the Schulz patent from work Applicant performed empirically on bath tissue in 1997-1998. Applicant does not consider Schulz to be related to the present case because of the following reasoning.

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Schulz is easily visible to the unaided eye. The Schulz product is at least an order of magnitude larger in scale than the softening pattern in the present invention of the instant U.S. Patent Application.

The embossing pattern disclosed in Schulz is focused on significantly increasing the visual appeal and bulk (z-direction thickness) of the embossed tissue. Any increase in softness in Schulz was an ancillary benefit. By contrast, the present invention is focused on increasing the softness of the embossed tissue, and significant increase in visual appeal or bulk attributable due to the decorative embossing pattern.

The embossing pattern disclosed in Schulz is focused further on the visible icons which cover a small percentage of the product surface area, and a method to improve their visibility. By contrast, the present invention is focused on the entire product surface area, or the area between the icons.

Schulz is focused on producing a tissue with "signature bosses" and speaks extensively to methods of producing these bosses such that they will have good clarity. A number of references throughout the document plainly indicate that the bosses in question are intended to enhance the visual appearance

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of the embossed tissue sheet. They must therefore be visible to the unaided human eye.

The Schulz disclosure, at Col. 1, lines 14-15, indicates that the Schulz invention requires the finished embossed sheet to exhibit "high bulk and good emboss pattern definition."

The Schulz disclosure, at Col. 4, lines 10-13, states that "Signature bosses may be made up of any emboss design and are often a design which is related by consumer perception to the particular manufacturer of the tissue."

The Schulz disclosure, at Col. 5, lines 62-65, further states that "The signature bosses enhance the puffy or filled appearance of the sheet both by creating the illusion of shading as well as by creating actual shading due to displacement of the sheet."

The size of the bosses used in the Schulz examples cited, as well as their distribution and area coverage, can all be determined from the dimensioned figures shown in the patent.

The Schulz Figures 2, 4, 5, and 8 show that the bosses disclosed were envisioned to have a height of 0.060".

The Schulz Figures 1, 3, 6, and 7 show the bosses being arranged in a large array so as to present a visually distinct appearance.

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The Schulz Figures 13 and 14 show photographs of tissue sheets made with these arrays which are plainly visible to the unaided human eye.

Schulz also is focused on increasing the bulk of the tissue. By contrast, the present invention does not significantly increase the bulk of the tissue sheet unless combined with the optional icon embossments.

The Schulz disclosure, at Col. 1, lines 60-62, states that the Schulz invention "provides an embossed paper product which is significantly higher in bulk than prior art products."

The Schulz patent disclosure, at Col. 4, lines 66-67, states that the Schulz "invention is a paper product having improved bulk and superior pattern definition characteristics".

These citations show that Schulz was directed specifically toward production of a high bulk, visually distinct tissue sheet through the use of bosses which are easily visible to the unaided human eye. A side effect of this direction was to limit severely the percentage of the sheet which is covered by the bosses so that there is plenty of white space around them to provide visual contrast.

This is in contrast to the present invention, which has been specifically directed toward production of a softer tissue sheet

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through the use of bosses which are so small as to be invisible to the unaided human eye and cover a large percentage of the tissue sheet. The following table contains a comparison of the major features of these two cases.

Present Invention	5,620,776	Schulz
Embossing element height (range claimed)	0.0 - 0.1 mm	0.076 - 3.048 mm
Embossing element height (range used)	0.0 - 0.1 mm	0.381 - 1.524 mm
Embossed area (useable range)	85 - 100%	0 - 15%
Visible signature bosses	Optional	Required
Invisible softening bosses	Required	Not mentioned
Pattern of bosses	Any	Regimented

Notwithstanding the Examiner's statement in the last line of paragraph 3, nowhere in Schulz does it state that the roll produces invisible depressions in the tissue. Following two thorough readings of the Schulz document, Applicant finds no instance of the word "invisible," nor do any phrases indicate that any part of the embossments are invisible to the unaided human eye.

An embossing pattern may be engraved to any desired depth. In order to be visible to the unaided human eye, i.e., to achieve the goal of a visually attractive and distinctive design, an embossing pattern must be engraved to a depth at least as great

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as the thickness of the paper to be embossed. For example, tissue is commonly about 0.008" thick. More commonly, the depth of engraving is at least four (4) times the thickness of the paper to be embossed. Most commonly, the depth of engraving is five to seven (5 to 7) times the thickness of the paper to be embossed. Thus, it is plain that in the Examiner's citation (Col. 2, lines 5-24), Schulz has chosen a range of engraving depths that was convenient rather than functional. Assuming that the embossing pattern described in Schulz were to be engraved according to the description and with an engraving depth of 0.1 mm, approximately 0.004", or $\frac{1}{2}$ the thickness of a common tissue sheet, a side view of the engraved roller as it contacted the sheet would then be dimensioned as below:

This drawing illustrates the point at which the present invention contrasts to Schulz. In light of the preceding discussion, an embossing roller constructed and operated according to the above drawing will not result in a tissue product exhibiting "high bulk and good emboss pattern definition" (Schulz Col. 1, lines 14-15). Nor will it result in a tissue product exhibiting "puffiness and bulk" (Schulz Col. 11, line 58, and Col. 13, line 16). A roller constructed according to Schulz in the embossing

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height region where our claims overlap would not in fact result in the benefits claimed by Schulz

It is conceivable that one might use a roller engraved in this manner to produce the effect of the present invention to a lesser degree. However, Schulz neither claims, nor discloses this effect. Since the embossing pattern disclosed in Schulz covers approximately 10% of the tissue surface vs. the 100% claimed for the present invention, it would be expected to produce approximately 0.10 of the effect of the present invention. A softness increase of such reduced magnitude would not be measurable at a statistically significant level utilizing the test methods described in the instant application.

For the foregoing reasons, the rejection of Claims 8-9, 12-13, and 21-22 under 35 U.S.C. §103(a) as unpatentable over Schulz U.S. Patent No. 5,620,776 is based on an insufficient reference and is respectfully requested to be withdrawn.

Claims 10-11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Schulz in view of Rheingold U.S. Patent No. 3,563,819 (hereinafter "Rheingold").

Rheingold supplies more of the primary reference deficiencies of Schulz. Moreover, Applicant maintains that the Rheingold reference is not applicable. Further, Rheingold discloses the

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use of etching and stamping to cut out a finished part from thin metal sheet stock; and further it requires the use of etching in combination with stamping in order to achieve the desired effect while the invention requires merely one or the other. Rheingold fails to disclose the use of etching or stippling to produce a pattern on an embossing roll such as is utilized in the invention. Rheingold fails to disclose the use of stippling in any way. The Examiner has not addressed the lack of reference to "stippling" in any way as pointed out in response to the first Office Action.

The Examiner has rejected Claims 10-11, citing U.S. 3,563,819 Rheingold et al. in combination with U.S. 5,620,776 Schulz, to make a finding of obvious to:

- a) Use etching or stippling to create an embossing roll which would
- b) Result in a product with a minority of fiber to fiber bonds being broken.

The Examiner's argument here is that the percentage of the total tissue area covered by the embossing of the present invention is not discussed in the claims. However, it should not be necessary to limit the claims in this fashion given the weaknesses of the Schulz and Rheingold citations as discussed above.

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The percent embossed area is shown explicitly in the figures as described under the Examiner's point 4 of the Office Action, as addressed herein above, so if necessary, it could become a part of the claims without adding new matter.

Working from U.S. Patent No. 5,436,057, the limit of the embossed area as contemplated by Schulz as described in Col. 5, lines 8-10, states "the total percent area of debossments being less than about 20%, preferably less than about 15%, more preferably less than about 10%" and Col. 7, lines 37 and 41-42, "in FIG 2," and "the total surface area of pattern per sketch area is 6.3%."

There is no motivation to combine the Schulz and Rheingold references. One would not have combined Schulz and Rheingold except on the basis of hindsight after having had the benefit of Applicant's disclosure in the specification description of the instant application. Such reconstructive hindsight is 20-20 when one has the benefit of Applicant's disclosure, but the combination of proper should be made based on a motivation found in the references cited as a basis for rejection, not from Applicants's specification description as cited.

Even assuming but not admitting that one would have combined Schulz and Rheingold, the rejection of Applicant's Claims using

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Schulz in combination with Rheingold is subject to the deficiencies of the Schulz reference as discussed in respect to the Schulz patent herein above.

Rheingold further is an insufficient reference for the following reasoning:

Rheingold is focused on a method for cutting parts out of thin metal.

The Rheingold disclosure, at Col. 3, lines 70-72, states that "it is an object of the present invention to provide a mechanochemical sheet metal blanking system."

The Rheingold disclosure, at Col. 6, lines 44-45, indicates that Rheingold considers the metal to be thick if it is "0.015 inch or thicker."

The Rheingold disclosure, at Col. 7, lines 22-33, states that an advantage of the system described is that "extremely complex shapes can be cut in very thin ductile sheet metal."

The Rheingold disclosure, at Col. 7, lines 51-53, confirms this when it states "Only thin stock is employed, varying from 0.003 inch to 0.06 inch. A preferred range is 0.003 inch to 0.025 inch."

By contrast, Applicant's invention as claimed requires a method for roughening the surface of a steel roller. The tube

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walls of the roller are at least 1 inch thick, and generally range between 2 and 3 inches thick. The roller also may be made of a solid steel shaft.

Further, Rheingold speaks to chemical etching as a means of obtaining a specified part from a sheet of similar material.

The only mention of etching is in reference to a means to separate a relatively large partially punched part from the parent stock of metal.

Rheingold makes no mention of chemical etching as a means of achieving a specified surface finish on the metal, that being the purpose of etching as used in the present invention as claimed.

The Rheingold disclosure, at Col. 5, lines 71-72, states that "there is a definite line (crack) of peripheral division between the part and stock." Also the Rheingold disclosure at Col. 9, lines 46-47, teaches "For the remaining thickness of the part and stock a fracture (crack) surrounds the part." Therefore, the punching operation must be construed as having mechanically broken a portion of metal in the shape of the desired part partially free of the remaining metal stock.

By contrast, the action of mechanically stippling, i.e., striking with a punch or other means to create a dimple or crater in the surface of the metal stock an embossing roller for the

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present invention does not create a crack between the portion which has been struck and the remainder of the metal stock, and operates without removing a significant portion of the metal stock while creating any given dimple.

Rheingold discloses embossing only in the application of embossing metal. Tissue paper is not mentioned.

Notwithstanding the Examiner's statement in the Office Action at the third line of paragraph 4, nowhere in the Rheingold disclosure does it indicate stippling as a production method. Following two thorough readings of the document, Applicant finds no instance of the word "stippling," nor do any phrases indicate that stippling is being performed.

Stippling as defined by Applicant's copy of The American Heritage Dictionary (1985, ISBN 0-395-32944-2) as "1. To draw, engrave, or paint in dots or short strokes. 2. To apply (paint for example) in dots or short strokes. 3. To dot, fleck, or speckle" also "1. The method of drawing, engraving, or painting by stippling. 2. The effect produced by stippling."

Neither does Applicant find any discussion which in any way implies that stippling is a desirable effect or procedure. On the contrary, the preferred end state is to provide a sheet metal part which has been removed from the sheet stock with as little

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damage as possible. If the sheet metal is mechanically stippled, or the resist coating is stippled onto the sheet metal, the etching chemical would be expected to eat away metal within the part resulting in undesirable pits or holes randomly placed within the manufactured part. The Rheingold disclosure at Col. 6, lines 62-72, states "It is to be observed that in addition to eroding the surfaces of the peripheral crack between the part and the embryo opening in the stock for the purpose aforementioned, the etchant also will attack any other part of the stock or part which is unprotected by the resistant coating."

Applicant does not believe that the Rheingold reference is properly relevant since the present invention is different from the separation of a visible portion of metal from the embossing roll body. Such separation of metal from the embossing roll body is neither required nor desirable for the present invention.

For the foregoing reasons, the rejection of Claims 10-11 under 35 U.S.C. §103(a) as unpatentable over Schulz, U.S. Patent No. 5,620,776 and Rheingold, U.S. Patent No. 5,620,776, is based on an improper combination of references and further on insufficient references and is respectfully requested to be withdrawn.

In the event the Examiner has further difficulties with the

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allowance of the present application, he is invited to contact the undersigned attorney for Applicants by telephone at (215) 794-9775 to resolve any remaining questions or issues by interview and/or Examiner's Amendment as to any matter which may expedite the completion of the prosecution of the application.

Acceptance of the formal drawings is hereby acknowledged.

Attached hereto is a marked-up version of the changes made to the Specification by the current Amendment. The attached pages are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Reconsideration of this application is requested.

Respectfully submitted,


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VERSION WITH MARKINGS TO SHOW CHANGES MADE

On page 1, at the first line after the Title, please insert:

--This application is a Divisional of prior, co-pending U.S.
Patent Application Serial No. 09/283,502 filed April 1, 1999, now
U.S. Patent No. 6,344,111.--